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EXAMINER	
ROBERTS, JESSICA M	
ART UNIT	**PAPER NUMBER**
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)
	10/822,476	ANTONIS, JAN
	Examiner	Art Unit
	Jessica Roberts	2621

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 November 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Acknowledgment of Amendments

The amendments filed on 11/14/2007 overcomes the following rejection(s)/objection(s):

The amendment to the specification has overcome the objection for minor informalities.

The objection of claims 12 and 13 for minor informalities has been withdrawn in view of applicant's amendments.

Response to Arguments

1. Applicant's arguments with respect to claims 1-13 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. Claims 1-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kosuge et al., US-6, 571, 196 in view of Bachelder et al., US-5, 974, 169 and further in view of Buckley et al., US-6, 064, 759.

Regarding **claim 1** Kosuge discloses a work surface providing an object plane on which, in use, the object to be inspected is located (XY stage; col. 4 line 14 and **6**); and a camera having a focal point and a field of vision arranged with respect to the work surface so that at least part of the work surface is within the camera's field of vision (video camera; col. 1 line 16-19 and **3.** Further, it is clear to the examiner that the video camera includes a focal point and field of view), the camera being arranged to capture an image of the object (fig. 2), the image comprising a plurality of image data components (pixels; col. 3 line 39), the system further including an apparatus for processing the object image (processor; col. 4 line 12 and **4**), the apparatus being arranged to receive the image data components from the camera and to identify a plurality of said image data components that represent the position of a respective edge component of the object in an image plane, wherein, during the capture of an image by the camera, the camera and the object are fixed with respect to one another (Kosuge; fig. 1), upon determining that an object edge data component relates to an edge of the object that is offset above the work surface, to adjust the value of the object edge data component by an amount depending on the ratio of the size of the offset in a direction generally perpendicular with the work surface to the perpendicular distance of the camera's focal point from the object plane (Kosuge; XY stage moves the inspection

object into a view field of the optical microscope, col. 8 line 62-64. The examiner takes the position that, upon determining that an object edge data component is above the work surface, to adjust the value of the object edge data component by an amount depending on the ratio of the size of the offset in a direction generally perpendicular with the work surface to the perpendicular distance of the camera's focal point from the object plane is nothing more that adjusting the field of view for the camera. Also, the examiner takes the position that the offset is when the object is not located in the field of view of the camera, which would include being offset in the x, y, and z plane).

Kosuge is silent in regards to the processing apparatus being further arranged to determine whether each object edge data component relates to an edge of the object that lies on the work surface or to an edge of the object that is offset above the work surface; and processing apparatus being arranged to project each image edge data component onto the object plane to produce a respective object edge data component in the object plane.

However, Bachelder teaches the processing apparatus being further arranged to determine whether each object edge data component relates to an edge of the object that lies on the work surface or to an edge of the object that is offset above the work surface (points apparently lying on a boundary of the object, but outside a bounding box, are ignored, col. 2 line 31-34); and processing apparatus being arranged to project each image edge data component onto the object plane to produce a respective object edge data component in the object plane (the boundary points in the image are labeled to denote the respective edges to which they belong based on the locations and

orientations of those points, and locations of the plural bounding boxes, col. 2 line 26-29).

Therefore, it would have been obvious to one of ordinary skill in the art to modify the apparatus of Kosuge with the technique as disclosed in Bachelder in order to provide improved machine vision methods and, particularly, improved methods for determining characteristics of an object in an image.

The combination of Kosuge and Bachelder as a whole are silent in regards to the apparatus being arranged to receive the image data components from the camera and to generate, using said image data components, three dimensional data representing the object, and wherein in order to generate said three dimensional data the apparatus is arranged to identify a plurality of said image data components the position of a respective edge component of the object in an image plane.

However, Buckley teaches apparatus being arranged to receive the image data components from the camera and to generate, using said image data components, three dimensional data representing the object, and wherein in order to generate said three dimensional data the apparatus is arranged to identify a plurality of said image data components the position of a respective edge component of the object in an image plane (Buckley discloses a three step process that includes to analyze the objects geometric model and determine by simulation which surface or edge points are required for inspection, direct this information to the inspection machine that with extract the 3-space coordinates of the required points form a similar physical object and calculate

the dimensions of that object using the measured points combined with the simulation analysis, column 2 line 52-65).

Therefore, it would have been obvious to one of ordinary skill in the art to modify Kosuge with the technique as disclosed in Buckley in order to optimize the inspection process in order to increase the speed and improve the accuracy of the inspection.

Regarding **claim 2**, the combination of Kosuge, Bachelder, and Buckley as a whole further teach wherein when an edge profile of the object taken in a plane generally perpendicular to the object plane is generally perpendicular to the object plane, or is undercut, said object edge data component is adjusted by subtracting an amount substantially equal to said ratio multiplied by the relative distance between the object edge data component and the position of the camera's focal point in the object plane (Kosuge, the XY stage moves the inspection object into a view of field of the optical microscope, col. 8 line 62-64. Furthermore, by moving the either the camera or the stage, it would allow for the object to be positioned a field of view of the camera).

Regarding **claim 3**, Kosuge teaches the processing apparatus is arranged to determine if the angle of the beveled edge profile is greater than the angle made by a line of sight from the camera's focal point to said object edge data component and, upon so determining, to adjust said object edge data component by subtracting an amount substantially equal to said ratio multiplied by the relative distance between the object edge data component and the position of the camera's focal point in the object plane and by adding an amount substantially equal to the distance in the object plane

between the edges of the beveled profile along said line of sight (Kosuge, the XY stage moves the inspection object into a view of field of the optical microscope, col. 8 line 62-64. Furthermore, by moving the either the camera or the stage, it would allow for the object to be positioned a field of view of the camera). Kosuge is silent in regards to wherein when an edge profile of the object taken in a plane generally perpendicular to the object plane is beveled.

However, Bachelder teaches wherein when an edge profile of the object taken in a plane generally perpendicular to the object plane is beveled (Bachelder, determining the characteristics of the object of any polygon shape; col. 4 line 64-66).

Therefore, it would have been obvious to one of ordinary skill in the art to modify the apparatus of Kosuge with the technique as disclosed in Bachelder in order to provide improved machine vision methods and, particularly, improved methods for determining characteristics of an object in an image.

Regarding **claim 4**, Kosuge teaches the processing apparatus determines that an object edge data component relates to an edge of the object that lies on the work surface, the processing apparatus is arranged to determine if the angle of the undercut edge profile is greater than the angle made by a line of sight from the camera's focal point to said object edge data component and, upon so determining, to adjust said object edge data component by an amount substantially equal to the distance in the object plane between the edges of the undercut profile along said line of sight (Kosuge, the XY stage moves the inspection object into a view of field of the optical microscope, col. 8 line 62-64. Furthermore, by moving the either the camera or the stage, it would

allow for the object to be positioned a field of view of the camera). Kosuge is silent in regards to an edge profile of the object taken in a plane generally perpendicular to the object plane is undercut.

However, Bachelder teaches an edge profile of the object taken in a plane generally perpendicular to the object plane is undercut (Bachelder, determining the characteristics of the object of any polygon shape; col. 4 line 64-66)

Therefore, it would have been obvious to one of ordinary skill in the art to modify the apparatus of Kosuge with the technique as disclosed in Bachelder in order to provide improved machine vision methods and, particularly, improved methods for determining characteristics of an object in an image.

Regarding **claim 5**, Kosuge is silent in regards to the processing apparatus determines whether each object edge data component relates to an edge of the object that lies on the work surface or to an edge of the object that is spaced apart from the work surface by calculating a respective first parameter relating to a notional reference line extending from the object edge data component, calculating a second parameter relating to a notional line extending between the object data component and a reference point in the object plane, and comparing the difference between said first parameter and said second parameter against a threshold value.

However, Bachelder teaches the processing apparatus determines whether each object edge data component relates to an edge of the object that lies on the work surface or to an edge of the object that is spaced apart from the work surface by calculating a respective first parameter relating to a notional reference line extending

from the object edge data component, calculating a second parameter relating to a notional line extending between the object data component and a reference point in the object plane, and comparing the difference between said first parameter and said second parameter against a threshold value (Bachelder; discloses where the method can use optional steps to identify and discard categorized boundary points that are out of line with similarly situated points. In addition, Bachelder also teaches any points lying more than a specified distance from the corresponding line are discarded, col. 9 line 51-63 and **48, 50.** Furthermore, the examiner takes the position that the object is spaced apart from the work surface to be that object edge is not in proximity of the other object edges).

Therefore, it would have been obvious to one of ordinary skill in the art to modify the apparatus of Kosuge with the technique as disclosed in Bachelder in order to provide improved machine vision methods and, particularly, improved methods for determining characteristics of an object in an image.

Regarding **claim 6** Kosuge is silent in regards to wherein said first parameter comprises the value of an angle between an angle reference axis and said notional reference line extending from the object edge data component.

However, Bachelder teaches wherein said first parameter comprises the value of an angle between an angle reference axis and said notional reference line extending from the object edge data component (Bachelder, col. 8 line 32-46 and fig. **3E** Bachelder discloses a method that categorizes boundary points of the object in the image as corresponding with edges of the real world object, or its model, if those points

lie in the corresponding bounding boxes. In accord with steps **42, 46** the method identifies points as residing in bounding boxes and therefore corresponds to the appropriate edge).

Therefore, it would have been obvious to one of ordinary skill in the art to modify the apparatus of Kosuge with the technique as disclosed in Bachelder in order to provide improved machine vision methods and, particularly, improved methods for determining characteristics of an object in an image.

Regarding **claim 7**, Kosuge is silent in regards to wherein said second parameter comprises the value of an angle between the angle reference axis and said notional reference line extending between the object edge data component and said reference point.

However, Bachelder teaches said second parameter comprises the value of an angle between the angle reference axis and said notional reference line extending between the object edge data component and said reference point (see analysis for claim 6. Furthermore, the method as disclosed by Bachelder includes to find points in respective bounding boxes, compare orientations of point with expected orientations and thus categorizing points as correlation with model or real-world object **42,44,46**).

Therefore, it would have been obvious to one of ordinary skill in the art to modify the apparatus of Kosuge with the technique as disclosed in Bachelder in order to provide improved machine vision methods and, particularly, improved methods for determining characteristics of an object in an image.

Regarding **claim 8**, Kosuge is silent in regards to said reference point on the object plane comprises the position of the camera's focal point in the object plane and said notional reference line extending from the object edge data component comprises a line normal to the object at said object edge data component, and wherein said threshold value is 90 degrees.

However, Bachelder teaches said reference point on the object plane comprises the position of the camera's focal point in the object plane and said notional reference line extending from the object edge data component comprises a line normal to the object at said object edge data component, and wherein said threshold value is 90 degrees (see analysis for claims 6-7. Furthermore, the method as disclosed by Bachelder includes to estimate position, orientation and uncertainty of object in image which includes where the points have a specified tolerance of the expected angular orientation of an edge, if so, the method categorizes the points as corresponding with the associated edge, col. 10 line 19-36 **36,42,44,46**).

Therefore, it would have been obvious to one of ordinary skill in the art to modify the apparatus of Kosuge with the technique as disclosed in Bachelder in order to provide improved machine vision methods and, particularly, improved methods for determining characteristics of an object in an image.

Regarding **claim 9**, the combination of Kosuge and Bachelder fails to teach the processing apparatus is arranged to calculate a line of sight from the camera's focal point to the object edge data component and to determine the point at which the line of

sight substantially meets the object edge, and to determine the amount of the offset depending on the location of said point.

However, Buckley teaches using a camera and a laser to determine surface measurements of the objects. The camera in conjunction with the laser intersects the object; the intersection points on the object are illuminated as a line and on the plate as a line. Each frame of the camera records the image of laser lines illuminating object as a set of three values; column value, row value and frame number. The set of values can be transformed or mapped into the (x, y, z) coordinate system to give the location of xyz points on the object surface with respect to the object reference system, col. 6 line 6-67 and col. 7 line 1-67 and col. 8 line 1-14).

Therefore, it would have been obvious to one of ordinary skill in the art to modify Kosuge and Bachelder with the technique as disclosed in Buckley in order to optimize the inspection process in order to increase the speed and improve the accuracy of the inspection.

Regarding **claim 10**,the combination of Kosuge, Bachelder, and Buckley further teach wherein the line of sight lies in a plane substantially normal to the edge of the object at the location of the object edge data component (see claim analysis for claim 9. Furthermore, Buckley teaches 3D imaging from edge points constructed from the column value, row value, and frame number of the pixel, col. 12 line 25-31).

Regarding **claim 11,** which recites a corresponding apparatus to the inspection system of claim 1. Thus, the analysis and rejection made in claim 1 also apply here

because the inspection system in claim 1 would necessitate the need for an apparatus capable of providing the limitations of the apparatus in claim 11.

Regarding **claims 12-13,** which recite a corresponding method to the system for inspection of claim 1. Thus, the analysis and rejection made in claim 1 also apply here because the inspection system in claim 1 would have necessarily performed the method steps in claim 12.

In further regards to **claim 13,** the combination of Kosuge, Bachelder, and Buckley as a whole further teach a processor based system. Hence a computer program product comprising computer useable code for causing a computer to perform the method steps of the system of claim 1 would have been inherent.

Conclusion

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Contact

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jessica Roberts whose telephone number is (571) 270-1821. The examiner can normally be reached on 7:30-5:00 EST Monday-Friday, Alt Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marsha D. Banks-Harold can be reached on (571) 272-7905. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/JMR/

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